October 16, 2006

Jeff Meberg, President
Nursery Products, LLC
12277 Apple Valley Road, Suite 131
Apple Valley, CA 92308

Re: Status of Research Concerning the Potential Human Health and Environmental Effects of Biosolids and the Relationship of Said Research to the State of California Department of Health Services Letter of May 5, 2005 to Mr. Doug Olson

Dear Jeff:

Per your request to provide an overview of the above referenced issue, I am herein summarizing my findings. I have organized this letter as follows:

- Historical perspective on the generation and management of biosolids, including the legal and regulatory framework
- Historical research conducted on biosolids
- The 2002 National Research Council study
- Ongoing and completed research conducted subsequent to the 2002 National Research Council study
- Analysis of the State of California Department of Health Services(DHS) letter of May 5, 2005 to Mr. Doug Olson in the context of the existing body of research
- A request to the opponents of land application of biosolids for documented proof of adverse human health effects
- Conclusions

Historical Biosolids Perspective

Biosolids or sewage sludge has been managed since the introduction of anaerobic digesters at centralized wastewater treatment plants during the mid-twentieth century. Initially only primary sludge was digested and converted to biosolids. However during the seventies and eighties secondary treatment of wastewater was mandated by EPA and state regulatory bodies. As a result of these mandates for cleaner water, the flow to digesters significantly increased with the resulting generation of secondary treatment sludge.

Biosolids have always been managed by a variety of techniques. Until 1992 the primary techniques included:

- Composting to recover the plant nutrient value of the material and enhance soil quality while reducing water consumption.

- Land filling in solid waste disposal facilities
- Land filling in dedicated biosolids surface disposal sites
- Ocean disposal – This process typically consisted of loading the material on a barge and disposing of the biosolids directly into the ocean
- Direct application to land for agricultural purposes
- Incineration in biosolids incinerators

In 1992 ocean disposal was banned, which had a significant impact on coastal communities.

Prior to 1993 there were no federal regulations controlling biosolids management. Instead there was a patchwork of local or state rules. As a result of the 1987 Clean Water Act Amendments, Congress had decreed that EPA must adopt regulations for biosolids management to ensure protection of human health and the environment.

Between 1987 and 1993, EPA conducted extensive studies and multi-media, multi-pathway exposure analyses and risk assessments in order to formulate a regulatory framework for biosolids management that would be protective of human health and the environment. On February 19, 1993 EPA adopted what would become known as the Part 503 regulations[1].

Historical Research Efforts

As the manager for EPA's effort to develop the Part 503 regulations, I became very familiar with the body of research that had accumulated since the 1960s related to biosolids management. Specifically EPA used 2,814 different references to develop the Part 503 regulations.

However those 2,814 different references are but a small part of the total body of research on this subject. To demonstrate the magnitude of biosolids literature that is available, I researched the following data bases:

- Biological Abstracts[2] (mention in the body of text of the article)
  - Biosolids- 890 Papers
  - Sewage Sludge- 5,366 Papers

- Scopus[3]
  - Biosolids- 1,341 Papers

[1] Part 503 refers to the portion in the Code of Federal Regulation where the regulation resides: 40 CFR Part 503 (58 FR 9248 to 9404, February 19, 1993)
[2] Biological Abstracts describes its database as a "Comprehensive coverage and context-sensitive indexing make the information in Biological Abstracts essential for all life sciences researchers. Biological Abstracts directs users to information on life science topics from botany to microbiology to pharmacology, serving to connect researchers with critical journal coverage." http://scientific.thomson.com/products/ba/
[3] Scopus describes its database as ". . . the largest abstract and citation database of research literature and quality web sources. http://www.info.scopus.com/

  - Sewage Sludge- 21,752 Papers

- PubMed[4]
  - Biosolids- 338 Papers
  - Sewage Sludge- 16,287 Papers

- Agricola[5]
  - Biosolids- 492 Papers
  - Sewage Sludge- 3342 Papers

Professor Nick Basta from Ohio State University conservatively estimates that there are at least 10,000 published papers on biosolids. I have been quoted as saying: "Biosolids is the most studied material that USEPA has ever regulated, with research records going back to the 1960's, 10 years before the establishment of USEPA." I stand by that statement today.

It is important to note that through all of this research no one has ever identified a documented adverse human health or environmental impact from the proper management of biosolids (emphasis added).

As noted below, legitimate questions concerning the land application of biosolids have been raised. However, research conducted to address these legitimate questions has not been able to identify and document adverse impacts on human health.

2002 National Research Council Study

The Clean Water Act not only mandated that EPA establish biosolids management regulations, but also to periodically reassess the scientific basis of the Part 503 rule and to address public-health concerns. By law this reassessment must occur at least once every two years.

In 2000 EPA asked the National Research Council (NRC) of the National Academy of Sciences to conduct an independent evaluation of the technical methods and approaches used to establish the 40 CFR Part 503 chemical and pathogen standards for biosolids, focusing specifically on human health protection. The NRC convened a Committee on Toxicants and Pathogens in Biosolids Applied to Land, which prepared a report in 2002.

The committees overarching findings were:

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[4] PubMed is the online database of the National Library of Medicine (NLM). The National Library of Medicine is on the campus of the National Institutes of Health in Bethesda, Maryland and is the world's largest medical library. http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?DB=pubmed

[5] The NAL Catalog (AGRICOLA) provides citations to agricultural literature. http://agricola.nal.usda.gov/

> "**There is no documented scientific evidence that the Part 503 rule has failed to protect public health.** (emphasis added) However, additional scientific work is needed to reduce persistent uncertainty about the potential for adverse human health effects from exposure to biosolids."

Biosolids use proponents focused on the finding that public health has been protected. Opponents to biosolids use focused on the need for additional study. As will be documented, EPA and the scientific community responded with an onslaught of additional research to address the NRC's concerns about the need for additional research.

Post NRC Study Research

My research has indicated that there have been more than 100 articles, research studies and/or presentations addressing the biosolids and/or related wastewater treatment issues since 2002. I have attached a bibliography of the research that I have identified to this letter for your use.

Of particular import is several EPA initiatives that EPA will continue to undertake to ensure human health and the environment are protected. The initiatives include:

- In accordance with Section 405(d) (2) (C) of the Clean Water Act, continue its "Biennial Review Cycle" to identify new chemical pollutants for potential addition to the Part 503 Standards to ensure that human health and the environment ~~is~~ are protected. Note that this review cycle provides for public review and comment, so any new evidence of adverse public health effects from new pollutants selected for evaluation can be easily added to the record.
- Improved compliance. EPA's Office of Water, which is responsible for reviewing the Part 503 regulations works with the Office of Enforcement and Compliance Assurance (OECA) to ensure compliance with the Part 503 regulations. Over the past six years, OECA has developed a very effective targeted strategy for compliance and enforcement of the Part 503 Standards that has resulted in significantly improved compliance with these Part 503 Standards.
- Improved microbial detection methods to address concerns about pathogens in biosolids and their associated impact on human health and the environment.
- Improved management techniques for ensuring compliance in the field with Part 503 requirements.
- A targeted National Sewage Sludge Survey to address the concerns expressed by NRC and others that EPA should execute a new analytical survey of chemical and microbial pollutants in the Nation's biosolids utilizing new and improved analytical techniques for data to be used in future risk assessments. Further, EPA will evaluate if new chemicals of concern may exist in current sewage sludge that weren't searched for or detected in 1988-89 and in 2001 when the last major National Sewage Sludge Surveys were conducted. To that end, EPA initiated its third National Sewage Sludge Survey in September, 2006.

- Improve the incident tracking process so that anecdotal reports can be quickly investigated to determine if purported human health effects on residents adjacent to biosolids sites are associated with the land application of biosolids.
- Accelerate the research in improved exposure measurement techniques from the land application of biosolids.
- Develop risk assessment methods to apply to pathogens in biosolids.
- Develop and apply analytical methodologies for detecting pharmaceutical and personal care products in biosolids.
- Make available information on pathogens in biosolids and animal wastes.
- Address the issue of soil reactions with constituents in biosolids
- Review the health based criteria for molybdenum in biosolids.
- Improve how stakeholders can participate in the updating and strengthening the scientific credibility of the Part 503 biosolids regulations.
- Work to identify future research needs in such areas as analytical chemistry and analytical microbial methods development, quantitative microbial risk assessments and efficacy of various wastewater and biosolids treatment technologies.

In summary, EPA and the scientific community has responded to the call for more research in the 2002 NRC study with over 100 research efforts. None of the results from the studies completed so far have indicated that the Part 503 regulations need to be revised to further increase the Part 503's already large margin of safety in the protection of human health and the environment from the land application of biosolids.

Department of Health Services (DHS) May 5, 2005 Letter

Background

In 2002 you opened the Nursery Products facility in Adelanto, California. Based on conversations with your staff and published accounts, your facility was challenged by the following set of circumstances:

- Receipt of inappropriate green waste that contained a significant amount of lawn clippings, decaying fruit and household trash. These materials caused the attraction of a large quantity of flies and other insects to this operation.
- Inadequate operating procedures that allowed this inappropriate green waste to not be mixed quickly with biosolids
- An inappropriate site that was too close to residential areas and the politically powerful Los Angeles Department of Water and Power (LADWP).
- A very active workers union at the LADWP who used any possible excuse to gain negotiating power over their employer.

As a result, Nursery Products created a substantial nuisance to the community when it started up in 2002. These challenges were overcome and subsequently you became a

model facility, albeit still located in an inappropriate location. Even your most ardent opponents ultimately conceded that:

> "Committee me mber Doug Olson has been among Nursery Products most vocal critics. In the past, Olson has said he would accept nothing less than the facility being shut down for good.
>
> By Friday's meeting, however, Olson spoke optimistically.
>
> "There is a smell there. There is a smell at the facility, but it's not a strong smell," Olson said after touring Nursery Products Friday."[6]

However in the intervening time you became involved in bitter litigation with LADWP which extended from October 2003 till 2005. In addition the LADWP conducted a public campaign against your operation which included falsely inciting the community.

As a result of these challenges the following set of events occurred:

1. Doug Olson expressed his health concerns to the federal Agency for Toxic Substances and Disease Registry (ATSDR) and requested assistance in addressing potential exposure and health concerns from the Nursery Products facility.
2. The California DHS works under a cooperative agreement with ATSDR followed up on Mr. Olson's concerns.
3. The LADWP worked behind the scenes with DHS to gain legal advantage. This is confirmed by the bcc of the May 5, 2005 DHS letter that was provided to the LADWP headquarters staff. If LADWP were not working behind the scenes, why send bcc copies?
4. On May 5, 2005, DHS responded to Mr. Olson with a letter that generated a significant amount of concern in the public's mind.

Within this context I have examined the DHS letter.

Over Arching Comments

The Department of Health Services has an excellent record of fair and unbiased research. Unfortunately in this case it appears that record was blemished for the following reasons:

- DHS did not consult with other local, regional, California or Federal agencies that have extensive research capabilities in the area of biosolids health effects, including co-workers within the Department of Health Services.
- Selective use for research conclusions.

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[6] Cobb, Nikki, Cooperation Takes Edge off Stink – Wind Shifts for Nursery Products in Adelanto, Victor Valley Daily Press, April 17, 2004, Victorville, California.

- Conducted a very limited review of the literature, e.g., two references from the literally thousands of existing studies.
- Reviewed limited site-specific data sources. The data used was primarily from the LADWP which was in litigation with the facility operator. No effort was made to solicit data from Nursery Products. No independently collected data were used.

I will address each of these issues in turn.

Lack of Consultation with Other Agencies

Consultation with Relevant California State Agencies

The May 2005 DHS letter appears to have been written without reference to or consultation with the California State Water Resources Control Board (SWRCB), the California Integrated Waste Management Board (CIWMB), and other DHS staff, all of which have conducted research in the area of biosolids management, including composting.

The SWRCB has regulated the land application of biosolids via a General Order since 2000, and the Regional Water Quality Control Boards (RWQCB) further regulate both land application and other mechanisms of biosolids management via Waste Discharge Requirements. In July 2004, the SWRCB certified a comprehensive Environmental Impact Report (EIR) that was prepared in conjunction with the General Order for biosolids land application. The EIR put to rest all legal challenges to the conclusions in the EIR and the basis of the General Order. The EIR process included the most thorough review to date of current research and science regarding biosolids undertaken by a California regulatory authority. While the focus of an EIR is on potential environmental impacts, the document represents a comprehensive analysis of the current science related to biosolids management. Tables E-17 and E-18 regarding reported outbreaks of bacterial and viral pathogens, due to biosolids exposure, may be of particular interest to DHS staff. In the May 2005 DHS letter, there was no mention of consultation with SWRCB staff or any reference made to the EIR. It should be further noted that the General Order endorses land application of biosolids (including its composted form) as the preferred management practice for biosolids in the State of California. This endorsement flows naturally from the conclusions of the EIR which in effect finds that the land application of biosolids in all of its forms is efficacious and safe when practiced in accordance with Federal (Part 503) and State of California regulations. [Please check on these last two sentences for accuracy.]

The CIWMB regulates composting operations in California and has composting facility requirements to support environmental health standards. In addition, CIWMB has published a Technical Bulletin and a local enforcement agency (LEA) Advisory regarding potential adverse health effects associated with airborne fungal spores. This bulletin and advisory served as the basis for a study conducted by DHS on bioaerosols from composting operations (see below).

Given that the CIWMB has regulations pertaining to environmental health standards and composting operations, the compliance status of the target facility relative to CIWMB regulations is important with respect to the complaint lodged with the DHS. In the May 2005 DHS letter, there was no mention of consultation with CIWMB staff or verification of the compliance status of the facility with respect to CIWMB regulations.

If this consultation occurred, DHS would have discovered that the Nursery Products facility was fully compliant with all local, regional, state and federal composting laws and regulations.

DHS issued a report to compliment the above-referenced Technical Bulletin and LEA Advisory in 1999. The report, entitled "Bioaerosols and Green-Waste Composting in California" (1999 DHS report), includes an evaluation of potential health impacts from bioaerosols associated with biosolids and solid waste composting operations. There was no reference made to this report in the May 2005 DHS letter.

I a letter dated August 2, 2005, Dr. Howard Levenson, Deputy Director of the Permitting and Enforcement Division of the CIWMB expressed his concerns about DHS' May 5, 2005 letter. In this correspondence, Dr. Levenson states

> ". . . Composting is one of the best alternatives that provide a controlled process to meet pathogen reduction (elimination) requirements while converting biosolids to a beneficial value-added product. In the absence of specific epidemiological data, anecdotal incidents should not be used to implicate potential symptomatic exposures significant to composting. Additionally, CIWMB staff is not aware of studies indicating a direct association between biosolids composting and public health impacts that would provide a justification for increased regulatory concern or specific emission controls. Therefore, until more conclusive epidemiological data is available, reasonable site-specific mitigation measures should be evaluated to protect the public health and safety."

I fully concur with CIWMB's statement.

Consultation with Relevant Regional Agencies

There is no indication in the May 2005 DHS letter that any RWQCB or Air Quality Management District (AQMD) was consulted during this investigation, even though two AQMD's are mentioned by name in the letter. These agencies typically have regulatory authority over water discharges and air emissions from composting facilities. Water discharges and air emissions are specific areas of concern discussed in the May 2005 DHS letter.

Selective Use of Research Results

National Research Council Report References

The quotes from and references to the National Research Council (NRC) 2002 "Biosolids Applied to Land, Advancing Standards and Practices" (the NRC report) cited in the DHS letter are incomplete and misleading.

- The DHS letter states that, "In 2002, the National Research Council of the National Academy of Sciences released a report concluding that the potential adverse human health effects from exposure to biosolids is uncertain and there is a need for the USEPA to update the scientific basis of Rule 503." This is a single sentence contained in the findings that has been taken out of context.

The overarching findings reached by the NRC (page 4 of the report), are:

> "There is no documented scientific evidence that the Part 503 rule has failed to protect public health. However, additional scientific work is needed to reduce persistent uncertainty about the potential for adverse human health effects from exposure to biosolids. There have been anecdotal allegations of disease, and many scientific advances have occurred since the Part 503 rule was promulgated. To assure the public and to protect public health, there is a critical need to update the scientific basis of the rule to (1) ensure that the chemical and pathogen standards are supported by current scientific data and risk assessment methods, (2) demonstrate effective enforcement of the Part 503 rule, and (3) validate the effectiveness of biosolids management practices."

All parties agree that updating the science behind the Part 503 rule is needed to ensure continued protection of public health. As I previously stated in this letter, that research has either been conducted or is in progress.

However, given the length of time biosolids have been land applied with no documented health effects, the magnitude of the potential health impacts implied in the statement from the DHS letter is inaccurate. Note further that the NRC had the authority to have called for a moratorium on the land application of biosolids if it discovered a threat to human health and the environment; it did not choose this course of action.

The NRC report goes further to say that "land application of biosolids has occurred for many years with little, if any, systematic documented evidence of adverse effects."

As a general response to all of the issues raised in the DHS letter, DHS should be reassured by the findings of the NRC. The 2002 NRC report offered no scientific documentation indicating inherent dangers from chemicals or pathogens found in the use of even Class B biosolids in land application programs as authorized and regulated under the Part 503 regulations.

In fact, on April 9, 2003, the U.S. Environmental Protection Agency (EPA) responded to the NRC report and unequivocally reiterated the science-based conclusion of the NRC Committee: that the land application of biosolids, based on peer-reviewed scientific evidence, remains a viable and beneficial management option that is protective of the public health and the environment.

The 2002 NRC report itself concluded that "there is no documented scientific evidence to indicate that the Part 503 rule has failed to protect human health." EPA corroborated this finding by acknowledging, "[a]t this time, EPA has not identified any additional toxic pollutants that warrant regulation in sewage sludge." Further, EPA confirmed its previous public support for land application, as well as more intensive treatment through biosolids composting, as a biosolids management alternative by noting that "the Agency [EPA] continues to believe that the land application of biosolids is an appropriate choice for communities when conducted in compliance with EPA regulations." Additional biosolids composting regulations enforced by the CIWMB provide further assurances that both public health and the environment are being protected.

- The DHS letter states that “The NRC recommended the USEPA conduct additional studies looking at potential chemicals of concern in sewage sludge that are not currently regulated.”

Ongoing scientific studies are recommended in all areas pertaining to health and the environment. This requirement was not first raised by the NRC, but was included in the text of the Clean Water Act. Section 405(d)(2)(C) of the Clean Water Act requires EPA to review the Part 503 Standards no less frequently than every two years to determine if pollutants not considered in the first two rounds of the Part 503 Standards should now be evaluated for potential addition to the Part 503 Standards.

On December 31, 2003, at 68 Federal Register 75531-75552, EPA published the results of this activity. EPA gathered information on 803 pollutants that were monitored as part of the 1988-89 National Sewage Sludge Survey or have been reported in U.S. or foreign scientific literature. EPA then gathered physical, chemical, and toxicological data from the open scientific literature or recognized databases on these pollutants. Lack of sufficient data to even suggest a public health concern for most of these pollutants reduced the initial list of 803 to 40, for which valid hazard screening assessments for both human health and ecological impacts have been run. From the screening exercise, 15 pollutants were identified for further evaluation to determine if numerical Part 503 standards for them should be proposed for land applied biosolids.

EPA has and intends to repeat this process biennially. If sufficient new data is developed for any of the pollutants in the list of 803 or additional pollutants are detected in biosolids during subsequent biennial reviews, those pollutants will in turn undergo the above-described hazard screening assessment. Further, as noted above, EPA will be performing its third National Sewage Sludge Survey to update the 1988-89 and 2001 Surveys. To that end, EPA initiated this third analytical survey in September, 2006.

However, it should be noted that a technical conference on the state of science related to biosolids was held in January, 2004, just 18 months after the NRC report was issued. At this conference, which was attended by key EPA biosolids technical personnel, nationally renowned academic scientists stated that trace quantities of metals and anthropogenic organic compounds found in today's biosolids have an insignificant impact, if any, on human health and the environment.

Their position is based on over 40 years of studies related to biosolids. Again, EPA will continue to perform its biennial review of chemical pollutants in biosolids, and seek additional data on these pollutants to determine if any warrant inclusion in the Part 503 Standards.

Limited Review of Existing Literature

The DHS letter acknowledges that a limited review of scientific literature was conducted as part of the investigation. The references cited include only two: Gattie (2004) and Herr (2002) besides the NRC work. The information extracted from these studies indicates that health effects relating to biosolids exposure, particularly via bioaerosols have been observed. This conclusion contradicts those reached in the research cited herein, including that performed by the DHS.

Given the fact that biosolids are one of the most researched materials ever regulated by USEPA, we find it troubling that only two papers were identified as available for review at the time of the investigation and that the review did not include work conducted by the SWRCB or DHS.

Overall, there has been a great deal of research conducted on this issue of biosolids and potential health impacts. In addition to the studies cited earlier in this letter, other sources of information can be found in the reference section of the research documents as well as from the United States Composting Council, United States Department of Agriculture, and the Water Environment Research Foundation.

- DHS Statement: "The NRC also recommended that a number of activities be conducted related to pathogen/disease causing microorganisms (bacteria, viruses, and parasites) standards, as there is question to whether 'current management controls are adequate to maintain minimal exposure concentrations over an extended period of time.' Rule 503 was implemented without an evaluation of the health risks from exposure to pathogens. The NRC stressed the need for USEPA to develop effective ways to monitor specific pathogens and evaluate the potential for regrowth of pathogens and bacterial toxins (endotoxin and exotoxins) that may occur after the waste treatment process (NRC, Gattie 2004). Concerns have also been raised about exposure to volatile chemical emissions, which are not regulated under Rule 503."

With respect to exposure from airborne pathogens for neighbors of land application sites, as noted above EPA has initiated a series of studies to determine the potential for this route of exposure to impact human health as well as to evaluate the adequacy of site controls.

There are also a series of studies (Brooks, Gerba, and Pepper, 2004; Dowd, Gerba, Pepper, and Pillai, 2000; Pepper, 2003) that have been conducted at the University of Arizona's Water Quality Center, funded by the National Science Foundation. These studies have measured the emission rates of pathogens of concern from biosolids-amended fields and have modeled ambient air concentrations of these pathogens. The results have indicated that nearby residents of these fields, even if they resided at close proximity, would have extremely low risks from pathogen exposures.

- The May 2005 DHS letter states that "In studies discussing potential exposure to pathogen-contaminated dust and runoff from land applied biosolids and composting (biosolids and green/yard waste), the health concerns reported by the adjacent communities show similar patterns (NRC 2002, Herr 2002). Symptoms commonly reported include respiratory infections, skin rashes, burning eyes, burning lungs, difficulty breathing, and gastrointestinal effects. These effects can be more severe in immunocompromised individuals, individuals with chronic disease, and other sensitive populations. Similar health effects have been observed in workers at composting and sewage treatment facilities."

Alleged adverse health effects were also considered by the National Research Council of the National Academy of Sciences in its review of EPA's current biosolids regulations. The NRC report noted that there are anecdotal reports attributing adverse health effects to biosolids exposures, "ranging from relatively mild irritant and allergic reactions to severe and chronic health outcomes" and concluded that "a causal association between biosolids exposures and adverse health outcomes has not been documented."

The May 2005 DHS letter suggests that there have been demonstrated health impacts associated with exposure to "pathogen-contaminated dust and runoff water from land-applied biosolids and composting." This appears to be based on a review of only two papers and did not include a review of the 1999 DHS report.

To our knowledge, there have been no documented health impacts due to routine exposure to biosolids operations. While there are many credible research papers on the subject of biosolids that could be listed here, the references provided below are the most pertinent to the issues raised in the May 2005 DHS letter.

- The 1999 DHS report states that, "A panel of international experts on bioaerosols, risk assessment, and composting was recently assembled to consider whether bioaerosols associated with the operation of biosolids or solid waste composting facilities endanger the health and welfare of the general public and the environment (Millner, et al, 1994). This group did not find epidemiological

evidence to support increased risk of allergic, asthmatic or acute or chronic respiratory disease in the general public at or around the several open air and one enclosed composting sites that were evaluated."

- The NRC report noted that while there are anecdotal reports that attribute adverse health effects to biosolids exposures, "a causal association between biosolids exposures and adverse health outcomes has not been documented."

- In December 2003, USEPA responded to a petition seeking a moratorium on the land application of biosolids. One of the categories of claims was on the basis of adverse human and animal health effects. EPA "concluded that the facts do not support a moratorium" and the agency denied the petition.

- The June 2004 SWRCB EIR (referenced above), indicates that there have been no reported outbreaks of disease associated with bacterial or viral pathogens due to exposure to biosolids.

- The 2005 research paper prepared by Brooks, Tanner, Josephson, Gerba, Haas, and Pepper, "A National Study on the Residential Impact of Biological Aerosols from the Land Application of Biosolids," was published in the Journal of Applied Microbiology in early 2005. The paper concludes that "Overall bioaerosol exposure from biosolids operations poses little community risk based on this study."

- The contention that workers in modern U.S. sewage treatment plants suffer more illness than workers in other occupations appears to have no basis in fact. One study compiled and reviewed the medical records of workers in Chicago sewage treatment plants and control groups of other Chicago workers. Statistical analyses of the data found no significant differences in death rates due to disease (Kuchenrither, et al., 2003). The study concludes that "No increase in disease or mortality in general populations next to wastewater treatment facilities or treated biosolids land-application sites has been reported in peer-reviewed literature."

- Occurrences of various relevant diseases in California counties where biosolids were land applied were compared to occurrence of those same diseases in counties where no biosolids had ever been applied. No significant differences in rates of illness were found (California State Water Resources Control Board, 1999).

- The July 19, 2005 draft report prepared by the Louisiana Department of Health and Hospitals, Office of Public Health, Section of Environmental Epidemiology and Toxicology, "Environmental Public Health Review, Covent LA," discusses the results of an epidemiological study that was conducted in the St. James Council Parish of Louisiana to determine whether reported health concerns could be attributed to environmental conditions, including but not limited to, the land

application of biosolids. The report concludes that "Although many health concerns were reported in the surveys by the residents, none of these health concerns can be attributed with absolute certainty to the environmental conditions in Convent, La (sic)." While we recognize this report was released after the May 2005 DHS letter was written and thus could not have been reviewed as part of the investigation, the conclusion further substantiates the lack of documented health impacts related to biosolids exposure.

It is clear from these documents that a claim of verified health impacts associated with biosolids land application and/or biosolids-green waste composting operations is not supported by scientific literature. Thus, the implication of certain health impacts made in the 2005 DHS letter appears to be lacking scientific basis.

Reviewed Limited Site-Specific Data Sources

Based on the information provided in the May 2005 DHS letter, the validity of the scientific process used to evaluate community impacts from the operation of the Adelanto composting facility is questionable.

- LADWP data were used as the basis for conclusions. There is no information that would suggest the data were validated or gathered under the supervision of the DHS or that confirmation sampling was conducted.

- LADWP has been in litigation against Nursery Products since 2003 and thus cannot be considered an unbiased party.

- Data provided by LADWP and reported in the May 2005 letter includes bacterial testing data from run off, air sampling data, (none of which said data was validated) and subjective observations.

- There was no attempt by DHS to request data from Nursery Products, even though data were available.

- No other data were reported in the May 2005 DHS letter and thus it appears that conclusions about the facility were drawn using non-validated data from a biased third party.

- The total coliform, fecal coliform, and e. coli are incorrectly classified as pathogens in the May 2005 DHS letter. These are bacteria that themselves are not considered pathogenic but that can be used to indicate the potential presence of pathogens, and they are ubiquitous in the environment. There is no information that would indicate that any actual testing for pathogenic organisms was conducted.

- The run-off data comparison does not provide any meaningful means of comparison. Specifically, there are no background levels reported and no comparative concentrations for other common types of run-off, such as urban stormwater and/or animal manure. Comparisons to these types of samples would provide the basis from which to determine if the observed levels were due to contamination from the facility, or if they are consistent with other sources or background concentrations. All of the bacterial parameters reported are commonly found in the natural environment. By means of comparison, data reported by the Los Angeles County Department Works for stormwater bacterial counts in fresh water creeks and rivers show levels within the range and exceeding those reported for the Nursery Products facility.[7] In the absence of a meaningful comparison, a valid conclusion regarding the source of bacterial components cannot be made with any degree of certainty.

- Runoff from composting facilities is typically regulated by the Lahonton RWQCB. There is no reference made in the May 2005 DHS letter to any consultation with the Lahonton RWQCB to address the issue of site runoff.

- The evaluation of the air quality data supplied by the LADWP does not appear to have included a review of background samples, confirmation sampling, or consultation with the Mohave Desert Air Quality Management District (MDAQMD), even though they are mentioned by name in the May 2005 DHS letter. With respect to the PM 10 discussion, the May 2005 DHS letter indicates that "It is not possible to determine whether PM 10 concentrations were elevated in other areas of Adelanto." This indicates that no background data were available or if available even considered. Further, Nursery Products has pictures demonstrating that LADWP employees purposefully threw dirt at the collectors and continually drove vehicles in front of the collectors to bias the results. In the absence of validated data or applicable background data, we question how a conclusion regarding the source of dust can be drawn.

- The May 2005 DHS letter states that "Another potential exposure concern relates to inhalation of volatile chemicals. A number of volatile chemicals, ammonia, hydrogen sulfide, and other sulfur and nitrogen based compounds are released from composting facilities. Currently, there are no monitoring requirements for these chemicals under Rule 503. In the Los Angeles area, the South Coast Air Quality Management District recognized the composting industry as a significant source of air pollution for criteria air pollutants."

The South Coast Air Quality Management District (SCAQMD) put forth regulations (Rule 1133) regarding composting, mulching, chipping, and grinding operations to regulate sources of volatile organic compounds and ammonia because they are

[7] Los Angeles County Department of Public Works 1994-2000 Stormwater Quality Data Tables; Yearly Log Mean Stormwater Bacterial Counts.

considered precursors to the formation of ozone. These air pollutants are regulated not because human exposure to these chemicals by themselves creates either an acute or chronic health risk, but because the South Coast Air Basin is a serious non-attainment area for PM-10 and the only extreme ozone non-attainment area. Much like the rest of the country, the MDAQMD does not have the same ozone air quality issues as the South Coast Air Basin, and therefore does not have similar regulations in place.

- The May 2005 DHS letter states that "Given the numerous odor complaints documented, it is clear that airborne releases of certain compounds occurred. However, DHS could not evaluate these exposures and potential health implications due to a lack of data." Further the DHS letter, in a contradictory statement, indicates that ". . . overall odors were characterized as being minimal."

This is a conclusion statement. The existence of odor complaints does not necessarily indicate what individual volatile compound or mixtures of volatile compounds were released if any were released at all, particularly if those odor complaints were not verified by at least one regulatory authority. Both the MDAQMD and the San Bernardino County Local Enforcement Agency have procedures and staff in place for that very purpose, but it does not appear that either of these local regulatory authorities was contacted by DHS staff.

Further most of the alleged odor complaints were generated by the inflammatory comments of the LADWP.

With respect to the concern about potential pathogen-containing dust, there are several studies regarding bioaerosols from composting and land application sites that are relevant to the inference that pathogen-contaminated dust is of concern. These studies were not referenced in the DHS letter and thus it is assumed that they were not reviewed as part of the investigation (see Limited Literature Review, above). As stated earlier, it is clear from these documents that a claim of verified health impacts associated with biosolids land application and/or composting operations is not supported by the scientific literature.

Conclusions Presented in May 2005 DHS Letter

The May 2005 DHS letter concludes "However, there is sufficient information both site related and in the scientific literature to suggest the possibility for some Adelanto residents (depending on time and location) to have been exposed to airborne contaminants (volatile chemicals), and dust originating from Nursery Products. While it is not possible to determine whether the health effects you have expressed were/are caused by exposures from Nursery Products, some of the symptoms you have expressed to DHS are consistent with biosolids-related exposures documented in the scientific literature."

I am not aware of any reports or studies that generically link reported human health impacts to exposures from biosolids composting operations. It is true that there are several anecdotal reports of human health impacts from individuals living adjacent to

biosolids land application sites and composting facilities. However, none of these anecdotal reports have ever been scientifically documented and verified, including this subject case.

Certainly, there is a potential for some biosolids composting operations to emit excessive amounts of airborne contaminants from their operations. However, this is dependent on site-related circumstances, operations practices and technology employed -- not generic principals. Examples of these site-related circumstances are: distance from the human receptor to the facility, wind direction and intensity, ambient temperature, other climatic conditions such as humidity, rainfall, etc. Even poorly operating composting facilities may not generate any complaints if they are sited at remote locations (large distances to human receptors). Conversely, well operated composting operations with advanced emission controls and operational plans, with features such as dust suppression, truck traffic mitigation, and odor control devices, can operate in close proximity to populated areas and generate little or no nuisance complaints.

Nursery Products has selected the best of both worlds to eliminate potential adverse impacts on the community:

- Locate in a remote location that is eight miles from any community and 1.5 miles from the closest neighbor.
- Employ a set of best practices to control dust and odor issues. These best practices will be implemented by use of an independently certified and verified Environmental Management System. (Note: Do we also want to mention additional controls imposed on the facility as a result of mitigation measures listed in the EIR and distinguish them from any other additional (voluntary) controls proffered as a result of the implementation of the EMS for this project? Let's take credit for any and all additional controls.)

The recommendation that "precautionary measures at the local level" be implemented is ambiguous. There was insufficient data to support this recommendation and thus it appears to be based on a cursory review of literature. While the recommendation may have been intended to address only the facility in question, it can easily be construed to suggest that all facilities are of some unspecified hazard to the local community, despite the operational standards that are mandated and enforced by the CIWMB and others. The rigors of our current regulatory structure simply do not support such a broad sweeping recommendation.

Request for Documented Health Effects from Opponents

As you know there is small community of people who oppose the land application of biosolids and biosolids-derived products such as composts as well as the construction and operation of biosolids composting facilities. This group includes Edo McGowan and Maureen Reilly.

Maureen Reilly was previously engaged by Nursery Products opponents and recently indicated that she had moved to Barstow, California from eastern Ontario.

These opponents have one key position:

> "The Absence of Evidence of harm from biosolids or composted biosolids is not Evidence of Absence of harm from biosolids or composted biosolids."

In short, these opponents love to wield the request to "prove a negativ e," which of course can not be done.

EPA and other regulatory agencies know that these technologies are safe from the simple observation that they and all of us have made:

> There has never been any significant verified/validated case of a negative human health impact in 60 plus years of biosolids land application and compost manufacture.

This conclusion is based on more than 10,000 studies of the issue.

To once again seek out proof of documented health effects, I have asked these opponents to "prove a positive." On July 3, 2006, I made a posting to the US Composting Council's list serve. This list serve has been used by the opponents and proponents of biosolids composting to share information and debate issues.

In the July 3, 2006 posting, I asked opponents to provide ". . . one scintilla of field or project operational data that scientifically supports your . . ." position of harm from composting biosolids.

To date the only response we have received is as follows:

> "The Sugar Creek study, a peer reviewed paper demonstrated that land applied sewer sludge (aka biosolids) does not stay where it is placed and the pathogens do move. Gerba in other contexts demonstrated that once within marine/estuary sediments, the sewage derived viruses had long surviv al and that even the fragments from some of virons were still infective. Dust is a vehicle for pathogen movement. Gerba in unpublished studies has noted contamination spread throughout a home. Rusin and Gerba published on finger to mouth transfer of pathogens. Workers at composting operations have reported similar symptoms to those reported by neighbors within areas of land applied sewer sludge. Monday morning fever is a classically studied condition. The literature is replete with other examples.
>
> "The State of California, through its Worker Comp program is now processing several adverse health claims by prison staff who works down wind from a sewer

> sludge composting operation. Since the prison guard to inmate ratio usually shows an abundance of inmates to guards, there is thus reason to suspect that several of the inmates are also suffering from similar illnesses. Because it is within the perview of Worker Comp, the files are not available. I have, however, discussed some of this with attorneys. These are not just ANECDOTAL reportings."[8]

I requested that Mr. McGowan provide a reference to the Sugar Creek study, since it is not a commonly known title in the field. In addition I have asked for more specifics concerning the California prison staff so we can verify the facts surrounding that situation. To date, I have received no response from Mr. McGowan on these requests.

I also contacted Professor Chuck Gerba from the University of Arizona who conducted the research that allegedly demonstrated adverse impacts. Professor Gerba stated the following when asked to comment on McGowan's allegations:

> "It is so totally out of context, mis-quoted and not my quote. Actually it does not even make sense to me."

In short, the opponents have not provided any proof of documented adverse effects on human health and the environment from the land application of biosolids nor from the manufacture and land application of biosolids-derived composts.

Conclusions

My analysis of these issues brings me to the following set of conclusions:

- There continues to be no documented proof of adverse impacts from the land application or composting of biosolids. This in spite of the fact that there are more than 10,000 studies on this subject and the practice has been occurring on a commercial scale for more than 40 years.
- There is an ongoing need to continue to study these issues as there is to study other health related issues in other materials recycling fields such as the use of animal manure in agriculture. Science is advancing at a rapid rate and we should continue to utilize these advancements to ensure the protection of human health and the environment from the appropriate recycling of biosolids and animal manures.
- EPA and the scientific community have responded for the call for more research from the National Research Council with at least 100 studies conducted and/or reported on since 2002.
- As more information is learned, EPA continues to biennially review the Part 503 standards to ensure human health and the environment are protected from the management of biosolids.

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[8] "Edo McGowan" edomcgowan@earthlink.net , Posting US Composting Council List Serve, Thursday, July 20, 2006 9:52 AM.

I hope this information is helpful in addressing the public's legitimate concerns. It is indeed unfortunate that project opponents continue to use half-truths and unsupported science to attack proper biosolids management.

Sincerely,

Alan B. Rubin, Ph.D.
Principal
ENVIROSTRATEGIES, LLC